Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

characteristics, and other details more or less obscured during the summer months. As Sargent says in his introduction to this work, "For the student of trees searching for accurate knowledge it is as important to study trees in winter as in summer." While the book has undoubted scientific value, its great value will lie in its bringing many into a little closer touch with nature.

The half-tone illustrations from actual photographs are remarkably good, bringing out details very clearly, for which no doubt the publishers deserve much credit. The colored plates, in so far as I am able to judge, are true to nature. Print, paper, and binding leave nothing to be desired.—ALBERT SCHNEIDER.

Cellulose.

IN 1895 Cross and Bevan published a large work under the title *Cellulose, an outline of the chemistry of the structural elements of plants.* Although that work was especially intended for chemists, it proved of assistance to physiologists who were concerned with this substance in its structural relations to have the chemical data brought together in a connected way. The same authors now issue a work entitled *Researches on cellulose, 1895–1900*,[3] which is intended as a supplement to the former one. It gives a brief account of those researches which have been published between the dates named, as well as certain of the authors' own investigations not previously published. No attempt has been made to give the subject-matter the form of a connected record. The papers are presented in abstracts, some very brief, some much longer, but all without comment. The book serves well to show the direction in which investigation is proceeding, and also the advances made in technical application of chemical knowledge. It would be well for botanists to familiarize themselves more thoroughly with the chemistry of cellulose. We should then hear less about the cell wall being "composed of cellulose," which, from a chemical point of view, tells as little about it as to say that a house is built of stone tells of its materials or its architecture. The investigations into the cellulose of fungi, the hemicelluloses, lignocelluloses, and pecto-celluloses are contributions to plant physiology as well as to chemistry. In spite of its technical character the book is one which botanical libraries should have.— C. R. B.

NOTES FOR STUDENTS.

V. K. CHESNUT[4] has published a very full account of the plants used by the Indians of Mendocino county, California. The numbers of plants used, and the uses to which they were put, are amazing to those not familiar with the subject.—J. M. C.

---

[3] CROSS, C. F. and BEVAN, E. J.: Researches on cellulose, 1895–1900. 8vo, pp. xii + 180. London, New York, and Bombay: Longmans, Green, and Company. 1901.

[4] Contrib. U. S. Nat. Herb. 7: 295–408. *pls. 10–21.* 1902.

A CONTRIBUTION from the Leipzig Institut on the function of hydathodes[5] comes to these conclusions: (1) they are not necessary to the plant for the prevention of the injection of the intercellular spaces, since plants do not suffer from injection (though *Impatiens parviflora* sheds a large part of its leaves); (2) they do not render the plant important service in the acquisition of mineral food by hastening the movement of water, for Pfeffer's *Physiology* says that even in the moist climate of the tropics transpiration keeps the leaves supplied! "We may therefore regard the hydathodes only as organs whose presence is now occasioned less by their necessity than by heredity." Since when? — E. B. COPELAND.

N. SCHULZ,[6] in investigating the relations of light to the germination of the spores of mosses, ferns, and equisetums, has reached the following conclusions: (1) these spores germinate only in light; (2) an exception to this rule occurs only in certain ferns that have other biological peculiarities, as ophioglossums, etc.; (3) light is necessary to spores of mosses and ferns as a stimulus to the transformation of the food reserve and to growth; (4) other stimuli cannot replace light in this process except in Ceratopteris, where it may be replaced by raised temperature; (5) in a sugar solution moss spores seem to germinate, but this growth, accompanied by stronger storage of starch and the prominent swelling of the spore, cannot be compared with germination under normal conditions; (6) the spores of equisetums produce cells that are not in resting condition and contain no food, and hence light is not necessary as a stimulus to digestion, but as a condition for photosynthesis.— F. M. LYON.

BLACKMAN AND MATTHAEI[7] have been observing the responses of certain leaves to traumatic stimulation. The leaves of *Prunus Laurocerasus* show remarkable vitality when removed from the plant, remaining fresh for more than a month, while oleander leaves remain fresh for several months, and even put forth roots if placed in water. Portions of old Prunus leaves were killed, and these patches of dead tissue were soon found to be cut off by an absciss layer and exfoliated. The absciss layer involves epidermis and mesophyll, and after exfoliation has occurred cutinization of the exposed parts takes place. When a number of wounds were made close together, a general absciss layer developed around all of these, and live parts as well as dead were exfoliated. In young leaves actual regeneration of new tissues, in distinction to the healing processes just noted, was observed. The authors discuss wound cork and other regeneration tissues, agreeing with Massart and others that suberization is due chiefly to a dry atmosphere.— H. C. COWLES.

---

[5] LEPESCHKIN, W.: Die Bedeutung der Wasserabsondernen Organe für die Pflanzen. Flora **90**: 42–60. 1902.

[6] Beihefte Bot. Centralb. **11**: 81–97. 1901.

[7] Annals of Botany **15**: 533–546. 1901.

O. ROSENBERG,[8] in investigating the pollen of *Zostera marina*, finds that the radially elongated archesporial cells give rise to tapetum on both sides of the sporangium by cutting off isodiametric cells at each end. Some of the primary sporogenous cells form sterile tissue. This is nourishing in nature and is later represented only by free nuclei between the spore mother cells. The long primary sporogenous cells destined to form microspores divide many times by longitudinal walls forming linear pollen mother cells. The tetrad divisions following are also longitudinal, and the second occur before the walls of the first reach the ends of the cells. The nature of these divisions is evidenced by their rapid succession and by the reduction of chromosomes from twelve to six. The remarkable thread-like form of the pollen (2000 by 8μ when mature) prevents the formation of the typical tetrad group, the microspores simply adhering in bundles. The solution of the microspore problem in Zostera is of special interest to morphologists since it clears away the last reported case of the formation of microspores from mother cells without the reduction division.—T. C. FRYE.

NELUMBO is certainly a perplexing form. The closed bundles, irregularly scattered, present a distinctly monocotyl feature; the leaves with reticulate venation suggest dicotyls, while the flowers might be either monocotyl or dicotyl. The earlier observers, dealing with mature seeds, have described the embryos of *Nelumbo* and of other members of the Nymphaeaceae as dicotyledonous. The recent work of Mr. H. L. Lyon[9] seeks to establish their monocotyledonous character. Material for the present work was collected in August, 1899, and August, 1900, in southeastern Minnesota, where acres of *Nelumbo lutea* grow in the bayous of the Mississippi river. A study of the development of the embryo shows that it retains a spherical shape until it consists of several hundred cells. The single cotyledon then appears as a crescent shaped organ partly surrounding the plumule. The cotyledon now becomes bilobed by a localization of growth. The first foliage leaf arises on the side opposite the cotyledon. The radicle is transitory and does not develop into a primary root, but the work is done by secondary roots arising from the hypocotyl. The only character which has kept the Nymphaeaceae among the dicotyls is the apparently dicotyl embryo. Since study of its development shows that the embryo is truly monocotyledonous, and since the anatomy conforms more closely to the monocotyls, Mr. Lyons refers the Nymphaeaceae to a subseries coordinate with the Potamogetonaceae, Alismaceae, and Butomaceae in the series Helobiae. A future paper will deal with the development of the embryo-sac and fertilization.—CHARLES J. CHAMBERLAIN.

[8] Ueber die Pollenbildung von Zostera. Meddel. Stockholms Högsk. Bot. Inst., pp. 21. 1901.

[9] LYON, H. L.: Observations on the embryogeny of Nelumbo. Minnesota Bot. Studies **2**:643–655. 1901.

It has long been known that the internal osmotic pressure of fungus hyphae is much greater when these are grown in concentrated solutions than when the medium is dilute. The question whether this is due to an absorption of the osmotically active substance of the surrounding medium or to an active secretion of other solutes into the cell sap has been taken up again by von Mayenburg.[10] That the internal pressure does not rise by mere inward diffusion of the surrounding solute, at least in most cases, was shown by Eschenhagen, and the present author (who uses *Aspergillus niger*) has corroborated this result by analyses of the fungus body. But in the case of glycerin there is an exception to this rule, as might be expected from the great power of this substance to penetrate most protoplasts. Fungi grown in concentrated glycerin solutions are found to contain this compound in about the same concentration as it occurs in the surrounding medium.

An attempt was made to determine the nature of the internally active substances in the more usual cases, where inward diffusion plays no important part in the rise of turgor pressure. Mineral salts and potassium salts of organic acids are shown to be unimportant in this regard. The author was unable to identify the active substance, but presents evidence which leads him to suggest that it may be some oxidation product of dextrose.

The author suggests that there may be a parallelism between the effects produced by mechanical checking of growth (in higher plants) and those caused by concentrated medium. Both agencies decrease growth and both are accompanied by rise in internal osmotic pressure.— B. E. LIVINGSTON.

SEVERAL valuable contributions to our knowledge of the process of fertilization have been recently made by Hans Winkler.[11] By an ingenious method this author was able to separate mature unfertilized eggs of the brown alga, *Cystosira barbata*, into two parts, the one nucleate, the other non-nucleate. He observed that sperms penetrate both parts, and that after their entrance both parts divide and produce normal embryos. Cell division, however, is somewhat more rapid when the female nucleus is present.

Winkler was also able to corroborate Morgan's observation that non-nucleate portions of the eggs of the sea urchin, *Echinus microtuberculatus*, will produce normal embryos after the entrance of sperms. The observation is carried further, however. If a non-nucleate portion be cut from an entire normally fertilized egg, this portion may be made to develop a normal embryo by a second fertilization. The experiment no longer succeeds, however, after the first cleavage plane has been formed.

Unfertilized eggs of *Arbacia pustulosa* were made to develop, at least as far as the 16-celled stage, by placing them in an extract of the sperms of the same species. The sperms were extracted both in distilled water and in concentrated sea-water, at a temperature of 70°, which is fatal to them. The extract was brought nearly to the concentration of normal sea-water (by the addition of concentrated sea-water or of distilled water, as the case demanded), and the unfertilized eggs were placed therein. The extract as used had a somewhat higher osmotic pressure than that of normal sea-water, but the author shows that this is not a fatal objection to his experiments, since the same concentration of KNO_3, $MgCl_2$, etc., produced no response in the eggs. Neither did a similar extract made from the sperms of another species have any effect. What is the nature of the chemically active body here demonstrated, the author cannot yet say. He closes the paper with some remarks upon the theory of fertilization.— B. E. LIVINGSTON.

---

[10] MAYENBURG, OTTOMAR HEINSIUS VON: Lösungs-concentration und Turgorregulation bei den Schimmelpilzen. Jahrb. wiss. Bot. **36**: 381–420. 1901.

[11] WINKLER, HANS: Ueber Merogonie und Befruchtung. Jahrb. wiss. Bot. **36**: 753–775. 1901.

ZACHARIAS[12] has recently made another contribution to the knowledge of sexual cells. Chemical and morphological researches upon the sperm cells of animals and plants indicate that the cilia and spiral bands of plant sperms correspond respectively to the tail and head of animal spermatozoa. The spiral band and the head are distinguished chemically by their nuclein content, nuclein being lacking in the cilia and in the tail. Besides many animal forms, the author investigated the sperms of Nitella, Chara, Ceratopteris, Pellia, Polytrichum, and other plants. The various forms were treated with a solution of sodium sulfate (sodium sulfate 10 gr., acetic acid 1 gr., water 100 gr.). To this solution a little acid fuchsin was added. This sharply differentiates the nuclein-containing portion from that which contains no nuclein, and shows that heads and spiral bands differ in their chemical behavior from tails and cilia. When solution with methyl green instead of acid fuchsin is applied to spermatozoa of the salmon, the head, which contains the nuclein, becomes swollen, while the tail and middle piece become sharply differentiated but do not stain. The tail and middle piece, however, stain well when acid fuchsin is used. When alcoholic material of the spermatozoa of Triton is treated with the fuchsin-containing solution, the tail and middle piece are not at all swollen but become stained, the latter very intensely. The head appears swollen and slightly stained, but the staining may be due to a delicate covering and not to the nuclein-containing content of the head. Living sperms of Chara and Nitella show the anterior and posterior portions of the band not at all swollen but intensely stained, while the middle portion is not at all stained but is very much swollen. Zacharias was able to satisfy himself that the middle piece of Triton and the salmon, as well as the blepharoplasts of Chara and Nitella, contain no nuclein. The term "middle piece" is variously used, but only when it is of centrosome origin is it to be compared with the blepharoplasts of plants. In some cases he was able to determine that the portion of the male sexual cell which is derived from the nucleus of the mother cell contains a larger percentage of nuclein than the nucleus of the female sexual cell. The investigations of botanists and zoologists have not yet determined the nature of the influence that the sperm exerts upon the egg in normal fertilization, but evidence is accumulating, and the present paper adds some interesting facts in regard to the chemical behavior of the sperm cells of animals and plants.—CHARLES J. CHAMBERLAIN.

---

[12] ZACHARIAS, E.: Beiträge zur Kenntniss der Sexualzellen. Ber. d. deutsch. bot. Gesell. **19**: 377–396. 1901.

ARNOLDI[13] has made another contribution to our knowledge of morphology of gymnosperms. The previous papers of the series have already been reviewed in the GAZETTE. The present paper deals with Sequoia and other members of the Sequoiaceae, namely Taxodium, Cryptomeria, Cunninghamia, Arthrotaxis, Glyptostrobus, and Sciadopitys. As might be expected, in a paper dealing with so many and such inacessible genera, the series are often incomplete, but the results are nevertheless interesting and important. In *Cunninghamia sinensis* there are numerous archesporial cells and several embryo sacs attain a considerable degree of development. In *Sequoia gigantea* the endosperm develops uniformly, thus differing decidedly from *S. sempervirens*, in which the development at the middle of the endosperm differs from that at both ends. The archegonia occur singly or in groups, but are not so numerous as in *S. sempervirens*. There are two neck cells and no ventral canal cell. In Taxodium, Cryptomeria, and Cunninghamia the archegonia are grouped as in the Cupressineae, and have a common jacket, but sometimes there is a layer of endosperm between the archegonia. In Sciadopitys the neck is very peculiar, consisting of from four to eight vertically elongated cells. Proteid vacuoles are present in the archegonium and they probably arise from the jacket cells. These vacuoles are not found in any other members of the Sequoiaceae. No ventral canal cell was identified, but it may yet be found. In Cryptomeria the upper end of the egg becomes mucilaginous, and sometimes separates from the rest of the egg, but no ventral canal cell is formed.

In *Sequoia sempervirens* at the time of fertilization the pollen tube contains two male cells and two free nuclei, one the nucleus of the pollen tube, and the other the nucleus of a disorganized cell which Belajeff called the sterile cell of the generative complex. No vegetative cell of the male prothallium is formed. The body cell contains starch. In *S. gigantea* the pollen tube presses between the endosperm and the nucellus. The pollen tubes of Taxodium and Cryptomeria behave as in the Cupressineae. The upper part of the egg becomes mucilaginous and presses upon the neck cells from beneath, while an outgrowth from the pollen tube presses from above and forces its way into the egg. In *Sequoia sempervirens* the round male cell becomes elongated, one figure showing it spirally wound, but this may not be the normal form. In Taxodium, however, the spiral form is the usual one, and this is probably the case in Cupressineae also. The form is probably due to the narrow entrance, the male cell having a greater diameter than the neck of the archegonium. The behavior of the chromatin during fertilization is not described.

---

[13] ARNOLDI, W.: Beiträge zur Morphologie einiger Gymnospermen. V. Weitere Untersuchungen der Embryogenie in der Familie der Sequoiaceen. Bull. des. Nat. de Moscow, pp. 1–28. *pls.* 7–8. 1901.

In *Sequoia sempervirens* the sex nuclei fuse at the middle of the archegonium, then sink to the bottom and divide. Two cells are organized about the nuclei, and the lower nucleus divides again, thus giving rise to a row of three cells, the lowest of which becomes the embryo, and the middle the suspensor. The upper soon disorganizes, and at this stage the embryo appears to consist of two cells. The first division of the embryo is longitudinal. In Cryptomeria and Taxodium the fertilized egg nucleus passes to the base of the archegonium where two or three divisions occur. Cells are formed about the lower nuclei, but the upper ones remain free. Two or three tiers are organized, the lower one or two tiers forming the embryo, and the tier next above the suspensor.

This agrees with Strasburger's account of Juniperus, except that the free cells were not described. Cunninghamia agrees with Taxodium, Cryptomeria, and the Cupressineae. In Sciadopitys the series was very incomplete but enough was obtained to show that the embryology is very peculiar. The earliest stage found shows four free nuclei at the base of the archegonium, as in all the Abietineae. A later stage shows a "rosette," suspensors, and a loose tissue of embryonic cells. The lowest of these cells form the embryo, those next above develop into a second set of suspensors, still leaving some of the embryonic cells between the two suspensor systems. The figures bear some resemblance to Strasburger's figures of Araucaria, but in Strasburger's account the second set of suspensors, as described by Arnoldi, form a cap which is cast off, while the part between the two suspensor systems — or between the suspensor and cap — develops into the embryo. Arnoldi believes that the two species of Sequoia should constitute a family, the Sequoiaceae; that Taxodium, Cryptomeria, and perhaps Cunninghamia should be included in the Cupressineae; and that Sciadopitys is best regarded as constituting a special family, the Sciadopitaceae.— CHARLES J. CHAMBERLAIN.

D. H. SCOTT[14] has published a detailed account of the remarkable fossil

---

[14] On the structure and affinities of fossil plants from the paleozoic rocks. IV. The seed-like fructification of Lepidocarpon, a genus of lycopodiaceous cones from the carboniferous formation. Phil. Trans. Roy. Soc. B. **194**: 291-333. *pls. 38-43*. 1901.

Lepidocarpon, of which a preliminary announcement was made in this journal.[15] In 1897 Mr. J. Lomax found in the lower coal measures as trobilus that differed from those of the genus Lepidostrobus in that each megasporangium contained a single large functional megaspore and three aborted ones. No other Selaginella-like fossil had been discovered with fewer than four megaspores of equal size in a sporangium. Moreover, in the same block of stone were found many detached sporangia and sporophylls identical with those of the strobilus, interspersed with seed-like bodies clearly referable to the *Cardiocarpon anomalum* of Williamson. The latter structures differed from the megasporangia of the cone in possessing an integument and a slit-like micropyle. The conclusion suggested itself to Scott and others that Williamson may have been mistaken in identifying the structures as gymnosperm seeds, but on the evidence in hand it was impossible to refer them to a lycopod. In January 1900, Mr. J. Wild found a lycopod cone that settled the matter beyond question. The upper portion of this strobilus bears sporangia identical with those attached to the cone discovered by Lomax. The basal sporangia, however, are invested by an integument with micropyle, and in all respects agree with the organisms described by Williamson as the "seeds" of Cardiocarpon. In addition to the strobili mentioned, fragments and many detached sporangia have been found, enabling the author to give convincing proof that certain of the highest cryptogams bore seeds. In order that this fossil may not be confused with the Selaginella allies having non-tegumented sporangia, the Lepidostrobi, Scott established the genus *Lepidocarpon* to contain these lycopod "seeds."

A very full description of this interesting organism is given. The sporangia are described as elongated sac-like structures, attached by one surface to the sporophyll. The integument consists of a cushion-like upgrowth arising from the upper face of the pedicel of the sporophyll, enclosing the sporangium completely, except for a long slit running its full length. The sporangium wall is like that of Lepidostrobus, but the megaspore wall is said to be much thinner than that of a spore destined to be shed. It is membranaceous in character, but displays reticulations, characters between those of an embryo sac and a shed megaspore. In several instances prothalli quite comparable in structure to those of Isoetes or Selaginella were found. Archegonia could not be identified with certainty. One section of a prothallus displays cells of quite different form occupying the central region. The author tentatively suggests that they may belong to an embryo. This seems highly probable to the reviewer, who has many similar sections of *Selaginella rupestris*, which also is known to bear "seeds." The elongated cells correspond closely to the vascular bundle in its nascent stage, and the group of smaller cells near the apex of the prothallus to the cross section of the young root. The dark cell at the right in his *fig. 23* is in a position with reference to the embryo that corresponds to the archegonium out of which it has grown. The section of the fossil shows no suspensor, but in *Selaginella rupestris* these cells are often difficult to distinguish from those of the surrounding gametophyte. It is interesting to note that the transitional stages between completely tegumented and non-tegumented "seeds" have not been found. Scott suggests that the non-tegumented sporangia may be arrested organisms rather than younger normal stages. This view accords with Bower's recent studies of the sporangia of Selaginella. However, as detached sporangia are not uncommon in the region explored by Messrs. Wild and Lomax, more light may be shed upon them by later study.

---

[15] BOT. GAZ. 31: 279. 1901.

The points of likeness between a seed of a spermatophyte and that of a higher cryptogam are (1) the possession of an integument with a micropyle; (2) a single functional megaspore; (3) the retention of the megaspore, involving (4) the detachment of the seedlike organ as a whole and its indehiscent character. The essential distinction between the higher cryptogams and spermatophytes lies in the fact that in the latter pollination takes place on the parent plant. This point has been settled lately in three living species of Selaginella, but in the case of Lepidocarpon no satisfactory evidence has been found. No microspores have been found between the gaping valves of the integument. It may be that Lepidocarpon should be regarded as a seed in a nascent stage of evolution, and that pollination occurred as in the lower cryptogams after the spores were shed. It is the opinion of the author that this discovery in no way affects views held by him previously that the gymnosperms are of filicineous origin; and that their seeds differ too much in detail from those of the lycopods to warrant affinity. Nor does he think any light is thrown hereby upon the origin of the angiosperms. He regards Lepidocarpon as representing a branch of the phylogenetic tree parallel to or perhaps convergent with the spermatophytic phylum, but without genetic connection with it.—FLORENCE M. LYON.